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The Economics of Poverty Traps and Persistent Poverty: An Asset-Based Approach

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Abstract

Longitudinal data on household living standards open the way to a deeper analysis of the nature and extent of poverty. While a number of studies have exploited this type of data to distinguish transitory from more chronic forms of income or expenditure poverty, this paper develops an asset-based approach to poverty analysis that makes it possible to distinguish deep-rooted, persistent structural poverty from poverty that passes naturally with time due to systemic growth processes. Drawing on the economic theory of poverty traps and bifurcated accumulation strategies, this paper briefly discusses some feasible estimation strategies for empirically identifying poverty traps and long term, persistent structural poverty. We also propose an extension of the Foster-Greer-Thorbecke class of poverty measures to provide a natural measure of long-term welfare status. The paper closes with reflections on how asset-based poverty can be used to underwrite the design of persistent poverty reduction strategies.

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I. WHY WE NEED AN ASSET-BASED APPROACH TO POVERTY

The first of the eight Millennium Development Goals agreed by all 191 United Nations member states – halving global extreme poverty by 2015 – underscores the centrality of poverty reduction in contemporary development discourse. Interwoven with this emphasis on poverty reduction is a widespread sense that the economic liberalization that characterized economic development policy in the 1980s and 1990s has come up short in reducing poverty, even if it has at times spurred economic growth. Recently, John Williamson, who coined the term Washington Consensus that is often used to label the suite of liberalization policies popular in the 1980s and 1990s, argued that governments must ensure that citizens have the minimum asset base and market access required to save, accumulate and succeed in a market economy (Williamson, 2003). Williamson suggests that without such assurance, some households will be trapped in poverty, unable to use time and markets to fundamentally improve their well-being or that of their children.

Implicit in the Washington Consensus was a structural approach to poverty alleviation based on both enhancing the returns that poor households earn on their assets[1], and facilitating their accumulation of productive assets. More specifically, economic liberalization was hypothesized to combat poverty by:

1. 'Getting prices right' through domestic and international trade liberalization which, according to conventional trade theory, should raise returns to unskilled labor, the most abundant factor in poor countries and the most abundant endowment of poor households within those countries;[2]

[1] In the language of economic theory, we refer to household endowments when we speak of "assets".
[2] The Stolper-Samuelson and factor price equalization theorems offer general explanations as to why returns to an abundant factor (unskilled labor in the case of a poor country) should increase following trade liberalization. De Janvry and Sadoulet (1993) offer a more grounded analysis about why trade liberalization in Latin America would be expected to "relink growth with poverty reduction."

2. ‘Getting institutions right’ by assigning secure, private property rights to land and other productive assets, a move hypothesized to bolster investment and accumulation, especially by poor households that most often experience insecure ownership rights;[3] and,

3. Deregulation and elimination of financial market interventions in order to open the way for private sector providers able to meet the capital and risk management needs of poor households, further spurring savings and accumulation by poor households.[4]

But are these now-standard liberalization policies enough to combat persistent poverty, or must governments do more, as Williamson and others have recently argued?

Unfortunately, standard poverty measures have limited capacity to answer these important questions. First, standard poverty measures are defined over the wrong space to measure the impact of economic policies directly. While market-oriented liberalization and related economic policies aim to influence the accumulation of productive assets by the poor and the returns on those assets, standard poverty measures are defined over household expenditures or income. Second, and as a consequence of the first limitation, it is difficult with standard poverty measures to distinguish structural poverty trends from what Ravallion (2001) calls ‘churning,’ or transitory movements into and out of poverty, even when longitudinal surveys offer multiple observations on the well-being of individual households over time.[5]

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[3] Much of the literature in this area has been focused on agricultural institutions and investment (*e.g.*, see the summary in Feder and Nishio, 1998). More recent work (de Soto 2000, Field 2003) extend this same analysis to the urban context.
[4] A strong literature emerged in the 1970s and 1980s which argued that credit market interventions both crowded out private sector providers and skewed the access of credit toward higher wealth borrowers through what Gonzalez-Vega (1977) termed the “iron law of interest rate restrictions.” Others have argued that government credit programs in which loan repayment was weakly enforced created a default culture among borrowers which further inhibited private sector provision of credit.
[5] With long enough panels, this limitation might be moot, but in the short term of the policy present, panels with more than two or three observations in a span of a few years remain quite uncommon, making it difficult to identify robust trends in volatile income or expenditure flows data.

To overcome these limitations of standard poverty measurement, and speak directly to the core issues of poverty traps and long term, structural poverty dynamics, this paper proposes to reformulate poverty measurement in asset space. After discussing some of the limitations of standard cross-sectional and panel data analysis of poverty, Section II uses the work of Carter and May (1999, 2001) to identify an asset poverty line as a natural extension of the familiar flow-based concept of an expenditure or income poverty line. However, the asset poverty line by itself is insufficient to identify poverty traps and long-term structural poverty dynamics. Drawing on the economic theory of poverty traps and bifurcated dynamics, Section III then extends the inherently static concept of an asset poverty line, proposing an approach based on nonlinear asset dynamics that leads to a dynamic asset poverty line and the possibility of poverty traps. Unlike prevailing expenditure and income measures, this conceptualization of dynamic asset poverty can be used to understand structural poverty dynamics both analytically and empirically and lends itself to the design and evaluation of strategies for reducing persistent poverty.

Drawing on econometric ideas in Lybbert et al. (2004) and Barrett (forthcoming), Section IV then suggests an approach to estimating the dynamic asset poverty line, the threshold that distinguishes households who can be expected to grow out of poverty conditional on the dynamics of accumulation within a given economy from those who are likely to remain trapped in poverty in the absence of appropriately targeted interventions either to change their endowments or to change the dynamics of the system. Two other contributions to this volume (Barrett *et al.* and Carter *et al.*) adopt this method in their analyses of poverty in Kenya and Madagascar, and South Africa, respectively. We also propose a natural, dynamic extension to the Foster-Greer-Thorbecke (1984, hereafter FGT) class of poverty measures that have been the workhorse of poverty analysis for twenty years. Section V concludes the paper with suggestions for further refinement of asset-based approaches to poverty.

II. THE ASSET POVERTY LINE

Chart 1 schematically represents alternative approaches to measuring poverty.[6] The most common (first generation) approach to poverty measurement relies on household expenditure (or income) data from a single point in time. Once a money metric poverty line is defined, the population can be divided into poor and non-poor categories, and the standard suite of headcount and other FGT measures can be calculated to gauge the extent and depth of poverty within an economy. Application of these first generation poverty analysis methods to repeated cross-sectional surveys allows insight into the evolution of well-being of the less well-off members of a society.

However, as numerous authors have remarked, cross-sectionally based poverty measurement is unable to distinguish between two very different patterns of poverty, each with a very different meaning. Consecutive cross-sectional findings of, say, a 33% poverty headcount ratio could reflect a society in which the same individuals are persistently poor, period after period. In such a society, poverty would be experienced by only a minority, but intensely and indefinitely for those unlucky few. Alternatively, repeated observations of the same headcount ratio could reflect a reality in which poverty is a purely transitory phenomenon in which individuals would routinely swap places on

[6] To avoid clutter, chart 1 highlights only the most important decompositions. Logically, for example, households never observed to be poor could , in fact, be only stochastically non-poor in each observed period. The likelihood of such outcomes is low, however, thus we ignore such cases.

the basis of random outcomes, or perhaps based on age or other demographic process. Over time, all households would be poor one-third of the time, thus all would share the burden of poverty equally.

Clearly a society typified by the first reality would be a much more polarized society, one vulnerable to hopelessness among a large subpopulation – and perhaps inter-class strife – and thus quite different from the one typified by the second poverty process. Unfortunately, first generation poverty measures are incapable of distinguishing between these starkly different characterizations of the societies they aim to represent.

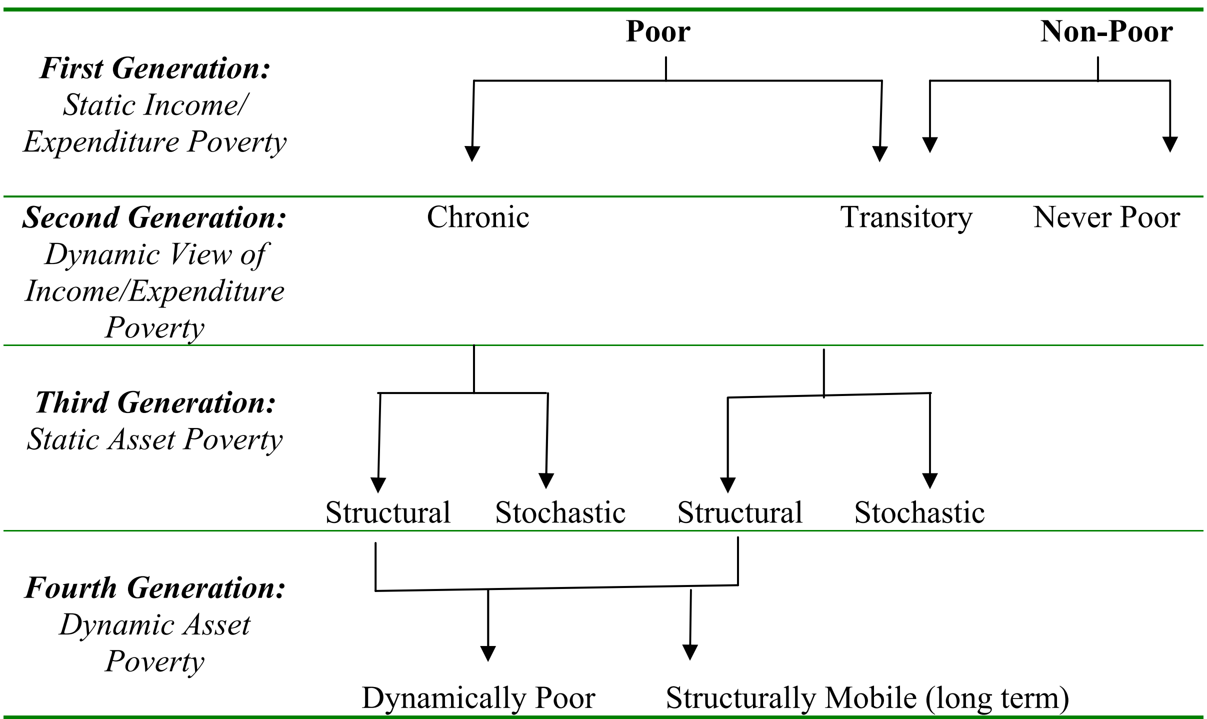


Chart 1. Alternative Approaches to Poverty Measurement

(a) Standard Panel Data Approaches to Poverty Dynamics

Interest in distinguishing between these two very distinctive situations has motivated a second generation of poverty analysis based on longitudinal or panel data that offer repeated observations over time on a single cohort of individuals or households. Grootaert and Kanbur (1995) offer an early and influential example of panel data-based expenditure or income poverty analysis. As illustrated in Chart 1, panel data permit a further decomposition of households into three categories: the always or chronically poor, the sometimes or transitorily poor, and the never poor. In a summary of initial studies of panel data studies of poverty, Baulch and Hoddinott (2000) report on detailed studies of poverty dynamics based on panel data from ten countries. Updating that effort, Hoddinott (2003) found that the number of panel studies of Africa had risen substantially. A common finding across all of these studies is that transitory poverty comprises a rather large share of overall poverty. The large share of transitory poverty based on income or expenditure underscores the inherent stochasticity of flow-based measures of welfare. People are better off one period than another without any significant or lasting change in their underlying circumstances, particularly the stock of productive assets under their control, due solely to random price and yield fluctuations and irregular, stochastic earnings from remittances, gifts, lotteries, etc.[7]

The Achilles heel of these informative, second generation poverty measures is that they cannot distinguish between very distinctive sorts of poverty transitions. Those individuals who appear to be transitorily poor in a standard panel study, moving from the poor to the non-poor state over time, can include individuals with two markedly different experiences. Some may have been initially poor because of bad luck. Their transition to

[7] The magnitude of measured transitory expenditure or income poverty may also reflect the measurement error to which flow-based welfare measures are especially prone. Transitory poverty would be purely a statistical artifact of imprecise measurement when, for example, non-poor households are mis-measured as poor in one period but correctly measured as non-poor in another period when nothing fundamentally changed between survey periods. Barrett et al. (this volume) show that measurement error and stochastic components to income data generating processes can completely mask structural patterns of income change over time.

the non-poor state simply reflects a return to an expected non-poor standard of living (a stochastic poverty transition). For others, the transition may have been structural, due to the accumulation of new assets, or enhanced returns to the assets that they already possessed (perhaps as a result of the new prices or asset building opportunities afforded by Washington Consensus policy reforms).

Similarly, those transitorily poor individuals who move the opposite direction over time, from being non-poor to poor, can represent a mix of experiences. For some, it could represent a return to an expected standard of living, after a brief non-poor hiatus afforded by a spell of good luck. For others, it could be a likely temporary transition caused by bad luck in a later survey period. Finally, for yet others, it could be a structural move caused by the loss of assets – e.g., due to illness, natural disaster or theft – or by a deterioration in returns to their assets brought on changes in the broader economy. Slightly more formally, the second generation approaches to poverty measurement cannot differentiate between stationary and non-stationary shocks to individuals' welfare, a crucial failing.

Consequently, even second generation poverty analysis is limited in its ability to speak directly to the inherently dynamic structural poverty issues that lie at the heart of the longstanding debates over the design of poverty reduction strategies and about the impact of neoliberal, Washington Consensus policies on poverty. If the real objective of poverty reduction policies is to provide a boost to those who would not otherwise climb out of poverty of their own accord, one needs to be able to identify both those households who are structurally poor at any given point in time and the likely transitions they will make with and without policy interventions. The remainder of this section details an asset-based approach to poverty analysis that enables these needed poverty decompositions, as shown in the bottom two rows of Chart 1.

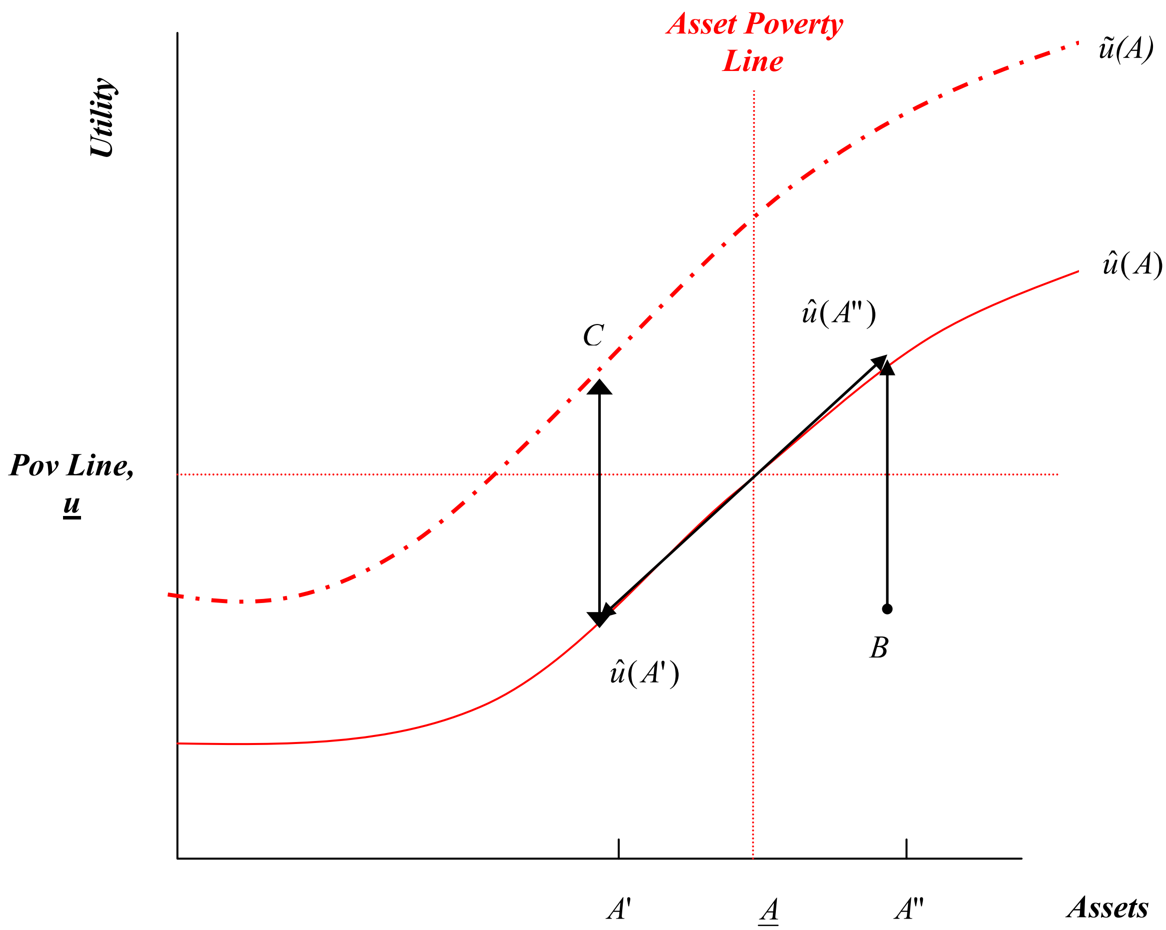
(b) Using the Asset Poverty Line to Decompose Poverty Transitions

Distinguishing stochastic from structural transitions requires information on assets and expected levels of well-being. Conceptually, this is a relatively straightforward exercise, as can be explained using figure 1, adapted from Carter and May (2001). The vertical axis measures a standard flow indicator of achieved material well-being (or utility), typically measured as income or expenditure. The conventional money metric poverty line measured in this dimension is denoted $\underline{u}$ in the figure. The horizontal axis measures the assets that generate a household's livelihood. While these assets are multidimensional, tangible and intangible, we assume here for illustrative purposes that assets are one-dimensional, or that we have non-problematically aggregated them into a one-dimensional index measure. We briefly discuss methods for building such an asset index in section IV.

Information on expected returns to assets would permit the mapping of the relationship between assets and income, expenditures or some other flow measure of well-being, as illustrated by the (expected) livelihood function graphed in figure 1.[8] The asset poverty line is then simply the level of assets (denoted $\underline{A}$ in Figure 1) that predicts a level of well-being equal to the poverty line, $\underline{u}$. Purely for expositional purposes, assume for the moment that the livelihood function does not change over time.[9] Then in any time

[8] The curvature of the livelihood mapping is itself interesting, as Carter and May (1999) and Finan, Sadoulet and de Janvry (forthcoming) discuss in detail.
[9] In general, we would expect the livelihood function, and therefore the asset poverty line, to move as rates of return change due, for example, to price changes or to technological change that affects productivity. We address this possibility shortly, as illustrated by the dashed livelihood function, $\tilde{u}(A)$ in Figure 1.

Figure 1 Single Period Income and Asset Poverty Lines



(adapted from Carter and May, 2001)

period, a household is stochastically poor if it holds assets worth at least $\underline{A}$ yet its realized income or expenditure falls stochastically below $\underline{u}$. Conversely, the household is structurally poor if its stock of assets is less than $\underline{A}$ and its realized income or expenditure level falls, as expected, below $\underline{u}$. The long-term outlook for structurally poor households is unfavorable, regardless of present realizations of well-being, while the long-term prospects for stochastically poor households is decidedly better. In order to be effective, policies must be targeted toward future expected levels of well-being, not toward (sometimes quite dated) past observations of income or expenditure. Hence the importance of the stochastic-structural poverty distinction, based on an asset poverty line.

Knowledge of the asset poverty line in conjunction with panel data makes possible the third generation decomposition of poverty transitions shown in the third row of Chart 1. A household that moved over time from above to below the standard expenditure-based poverty line could be said to have made a stochastic transition back to its expected status if the household's assets still mapped into an expected standard of living below the poverty line. In Figure 1, this transition is illustrated as the movement from point C back to the point $\hat{u}(A')$. Alternatively, a household that moves from $\hat{u}(A'')$ to $\hat{u}(A')$ would have made a structural transition below the poverty line due to a loss of assets from A'' to A'.

Similarly, a household that made the opposite observed expenditure transition (from below to above the poverty line) could be said to have made a structural transition if household assets predicted expenditure initially below the poverty line, at $\hat{u}(A')$, but in the subsequent period assets yield expected expenditures above the poverty line. Such a shift could occur either because of asset accumulation that moved the household to point $\hat{u}(A'')$, or because of improved returns on the household's stock of assets, which shifted the livelihood function from $\hat{u}(A)$ to $\tilde{u}(A)$, bumping expected and observed expenditures from $\hat{u}(A')$ to point C in Figure 1. As noted above, Washington Consensus policies have been hypothesized to facilitate both sorts of structural transitions out of poverty.

Finally, in figure 1, the stochastic transition out of poverty would be manifest as a movement from point B to *û(A")*, which merely reflects a return to a household's expected welfare level given its asset holdings and the livelihood function mapping assets into expenditures.

This asset based approach thus moves us considerably closer to being able to address the key questions surrounding households' longer-term prospects of being non-poor and how policy reforms impact on poverty by changing the livelihood function, inducing asset accumulation, or both. The challenge in implementing these ideas results from the need to estimate a livelihood mapping between assets and expenditures (or income). As a consequence, the asset poverty line is not known with certainty but can only be approximated statistically. Carter and May (1999) illustrate an application of this method to South African households, cautiously denoting a household as stochastically poor only if one can reject the statistical hypothesis that their assets are expected to yield flow-based welfare measures below the standard expenditure or income poverty line.

While one could quibble with components of their methodology, the Carter and May analysis nicely illustrates both the strengths and limitations of the asset poverty line. They estimate that less than half of the observed transitions out of poverty are structural, as 60% of the households who made the transitions had initial period assets that strongly predicted well-being in excess of the standard poverty line. In terms of downward mobility, Carter and May find that only a small fraction (15%) clearly fell into poverty for stochastic reasons, while fully 51% of those who fell behind suffered asset losses that left them structurally poor in the latter survey period. Households that are only stochastically non-poor remain a cause for concern – and an appropriate target for interventions by development agencies – since one would expect them to backslide in future periods.

While these figures give some further insight into the operation of one liberalized economy, they fail to indicate whether structurally poor households are likely to remain so into the foreseeable future, or whether they are headed in the right direction, nor whether structurally non-poor households can be expected to remain non-poor indefinitely, i.e., are they free and clear of the poverty line for good? Put differently, how many of the structurally poor are likely to be structurally mobile over the long term? Alternatively, how many are caught in a long-term trap of persistent poverty?

Answering these questions requires an approach to poverty based on asset dynamics. Similar to the way in which the single period asset poverty line can distinguish between stochastic and structural poverty transitions in the short-term, the remainder of this paper argues that a dynamic asset poverty line can help distinguish households caught in a long-term structural poverty trap from those expected to follow an upward trajectory, i.e., those who enjoy structural economic mobility. The next section develops the theoretical foundations for the dynamic asset poverty line, the threshold at which accumulation dynamics bifurcate, leading to multiple dynamic welfare equilibria, including the possibility of a poverty trap. Section IV then briefly discusses ways to estimate the threshold, to identify households caught in a poverty trap, and to measure poverty taking into consideration the natural accumulation dynamics of the system in which people operate.

III. POVERTY TRAPS AND THE DYNAMIC ASSET POVERTY THRESHOLD

Households who can steadily accumulate assets or who enjoy steady technical change or favorable shifts in their terms of trade will grow their way out of poverty. Among very poor populations, this growth could take some time, but movement nonetheless proceeds steadily in the right direction. For these households, time is a dependable ally in the fight against poverty.

Does time necessarily work in favor of poor households? Or is it more true that the many of the poor "can't get ahead for falling behind" (Barrett and Carter 2001-2)? As discussed in the introduction above, the neoliberal economic policies of the Washington Consensus reflect a logically coherent theory of asset accumulation and income growth by poor households. Seen from this perspective, time should indeed dependably oversee a domestic process of convergence as poor households climb out of poverty and catch-up to their better-off neighbors.

Analogous questions of convergence have figured prominently in the macroeconomic debate over the growth of nations.[10] While there are some critical differences between economic growth at national and household levels, macroeconomic growth theory and its attendant convergence controversy provides some useful insights and language for thinking about poverty and growth within nations.

(a) Lessons from the Convergence Controversy over the Growth of Nations

The workhorse model of neoclassical economic growth relies on an assumption of diminishing returns to assets (that generate a stream of income) to hypothesize that

[10] See the account given in Romer (1994).

poorer nations will tend to catch up over time, or converge, with the incomes of richer nations. However, overwhelming empirical evidence that income convergence does not accurately describe economic growth at the macro level of nation states. In the words of Lant Pritchett (1997), the observation of "divergence, big time" has invited twenty years' debate and new theorizing about alternative frameworks that might fit the data better.[11] Within the macro-growth literature, two alternatives to the neoclassical growth model have emerged: conditional convergence and poverty traps.

The idea of conditional convergence dates back at least to Baumol (1986) and DeLong (1988) writing on "club convergence", wherein distinct subpopulations (of nations, in their case) appear to converge on different steady-state growth rates. Quah (1993, 1996, 1997) extended this notion to more general distribution dynamics to explore the mobility of countries across income levels. The basic idea is that convergence occurs within distinct groups of naionts, or "clubs," while there can be divergence between clubs. Theories of conditional convergence thus turn fundamentally on the existence of an exclusionary mechanism that keeps members of one group or club facing a lower level equilibrium from moving to another group or club with a higher level equilibrium. The extant macro literature offers only rather vague suggestions as to why such exclusionary mechanisms might exist, hypothesizing about distance from sea ports, agroecological conditions and their impacts on health and agricultural productivity, natural resource endowments and their effects on incentives to industrialize, or the institutional legacies of

[11] Empirical work largely been cast almost exclusively in terms of income, not in terms of assets (capital stocks of various sorts). The primary exception has been the literature on "green national accounts", which worries about depreciation of the stock of natural capital (i.e., environmental resources) and the resulting sustainability of income levels as measured in the standard national accounts. Given that asset transactions overwhelmingly occur within rather than between countries, a large part of the asset changes that matter considerably at more micro (e.g., household) levels of analysis do not matter at the macro level of nation states.

colonial history, including intra-national ethnic diversity (Acemoglu et al. 2001, Bloom and Sachs 1998, Bloom et al. 2003, Easterly and Levine 1997, Masters and Macmillan 2001, Sachs and Warner 1997).

A related macro literature posits the possibility of poverty traps related to thresholds at which returns are locally increasing (Azariadis and Drazen 1990, Fiaschi and Lavezzi 2003, Murphy et al. 1989). In their essence, these theories merely formalize earlier, informal models of economic "take off" or "big bang" (Young 1928, Rosentstein-Rodan 1943, Nurkse 1953, Myrdal 1957, Rostow 1960), which likewise depended fundamentally on locally increasing returns. As with conditional convergence theories, the thresholds that define poverty traps would be quickly surmounted in the absence of exclusionary mechanisms.

Ultimately, then, according to the macro-level theories of economic growth, the keys to whether or not poverty could persist indefinitely for identifiable subpopulations are whether or not there exist locally increasing returns and exclusionary mechanisms that keep some people from enjoying higher return livelihoods or technologies. We now consider those possibilities at the micro level of households.

(b) Microeconomic Poverty Traps: Some First Principles

The key insight from the convergence controversy in the macro growth literature is that locally increasing returns to scale can thwart economic convergence in which initially poorer countries or regions catch up with initially wealthier regions. The key feature of locally increasing returns to scale is that over some range the marginal returns to additional capital or wealth increase as the level of capital or wealth increases. At the level of households, a positive relationship between wealth and the returns to assets can exist over some range of wealth for at least three reasons:

Case 1. The underlying income generating process may itself directly exhibit increasing returns to scale, either because the primal technology exhibits locally increasing returns or because input (output) prices or transactions costs are negatively (positively) related to scale over some significant range;

Case 2. Some high return production processes may require a minimum project size such that only wealthier households can afford to switch to and adopt the high return process; and

Case 3. Risk and financial market considerations may cause some lower wealth households to allocate their assets so as to reduce risk exposure, trading off expected gains for lower risk, thereby making expected marginal returns to wealth lower for lower wealth households.

While cases two and three are more likely, in reality, to cause a positive relationship between wealth and rate of return, we will first use the simpler case of an increasing returns production technology to discuss the economics of poverty traps.

When returns to wealth increase with the amount of wealth, two important things happen. First, poorer, low wealth households earn relatively low rates of return on their modest asset holdings, a factor which further perpetuates their poverty because they earn less investible surplus, after meeting immediate consumption needs, than do richer households. Second, the marginal short-term, or myopic, incentives to save are depressed. If household accumulation decisions are driven by these depressed returns and liquidity constraints, then the household would indeed be expected to reach an equilibrium asset holding at a relatively low level. A positive correlation between wealth and returns can thus lay the groundwork for understanding why poor households stay poor over time.

The key question then becomes whether or not household savings and accumulation behavior will be driven by these low marginal returns. A forward-looking household would know that while the marginal returns to further accumulation are low, increased accumulation has strategic value in moving the household closer to the asset level(s) where returns sharply increase. Clearly the household's first best option would be to borrow sufficient funds so that it could leap forward to a higher return asset level. Increasing returns would therefore no suffice by themselves to trap poor households at low asset levels.

If, however, poor households are rationed out of credit markets, as a now voluminous literature suggests, or if they lack socially mediated access to capital (as Mogues and Carter (2004) suggest they would in many polarized societies), then discrete jumps mediated by borrowing may not be possible. In the face of exclusion from financial markets, the poor household's only option would be to move forward slowly with an autarchic savings strategy. Note that this autarchic approach would require substantial short-term sacrifice (diminished consumption) with little return even in the medium term (as marginal returns to new assets are low). If the poor household finds it desirable and feasible makes this sacrifice, then it will—with sufficient time—reach the asset level necessary to achieve the higher returns and will eventually converge toward the asset and income levels of initially wealthier households. But many very poor households cannot afford to reduce consumption further, or at least the opportunity cost of tightening their belts further – e.g., in terms of foregone energy for work, withdrawing children from school, etc. – make autarchic accumulation unattractive. If the poor household opts not to undertake extraordinary savings, it then settles into a poverty trap.

A somewhat complex theoretical literature explores the conditions under which each of these two outcomes is most likely to occur (e.g., Loury 1981, Banerjee and Newman 1993, Galor and Zeira 1993, Mookherjee and Ray 2002). The basic intuition is, however, simple. It would seem likely that if a household was not "too far", in some sense, from the asset level where increasing returns occur, then it would be likely to pursue the autarchic accumulation strategy. However, as the distance from that level increases, it seems less likely that households would find it feasible and desirable to pursue the autarchic accumulation strategy. What Zimmerman and Carter (2003) call the "Micawber Threshold" is the critical asset threshold below which it is no longer rational or feasible to pursue the autarchic accumulation strategy.[12] If it exists, the Micawber Threshold thus constitutes a dynamic asset poverty threshold, analogous to the static asset poverty line discussed in the previous section. Households whose assets place them above that threshold would be expected to escape poverty over time, while those below would not. One needs to identify this dynamic asset poverty threshold in order to disaggregate the structurally poor into those expected to escape poverty on their own over time and those expected to be trapped in poverty indefinitely.

While different theoretical models imply different things about the existence of a Micawber Threshold, the existence of such a threshold is ultimately an empirical question that depends on the particularities of any given economy. To gain a sharper idea about how to locate and test for such a threshold, we now look in more detail at the case of

[12] We owe this label to Michael Lipton (1993), who wrote of a "Micawber Threshold," below which it is difficult for agents ever to accumulate assets. The image echoes the Dickensian travails of Wilkins Micawber, the perpetually insolvent debtor with whom David Copperfield took up residence, who moves in and out of different jobs and debtor's prison, unable to advance until he encounters and ultimately exposes the evil Uriah Heep.

locally increasing returns created by minimum size limits for some high return activities, following Case 2 identified above.

(c) Locally Increasing Returns, Poverty Traps and Asset Dynamics

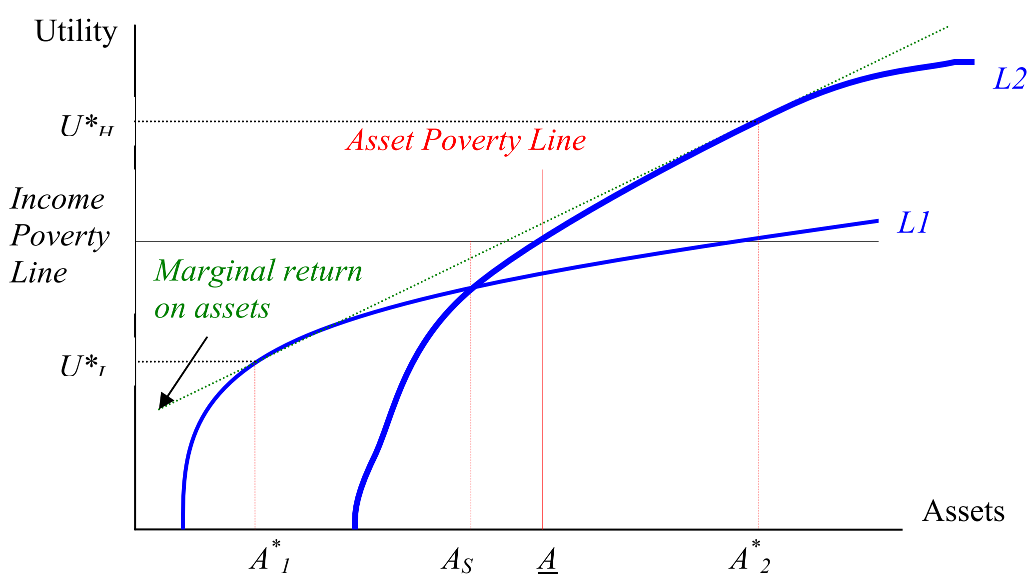
Consider now the case where a household can allocate its productive wealth to two distinct productive activities, L_1 and L_2. Both activities exhibit diminishing returns to wealth, as under the canonical neoclassical growth model. However, activity L_2 has a minimum scale of operation due to sunk costs of operation or of switching into L_2 (i.e., it generates no returns if the wealth dedicated to this activity is below this minimum level). Figure 2 graphs these two production technologies as well as the steady state asset values that a household would choose if it were exogenously restricted to one technology or the other. The value A_1^* denotes the steady state value for a household restricted to livelihood activity L_1, yielding income U_1^*, while A_2^* denotes the same thing for L_2, yielding the higher level steady state income, U_2^*.[13] The household with access to L_2 would eventually surpass the static asset poverty (denote $\underline{A}$ in Figure 2) and reach a non-poor standard of living.

Households are of course not exogenously restricted to one activity or another. Assuming that no risk or other constraints limit the adoption of the technologies, Figure 2 shows that the optimal livelihood choice for households is activity L_1 for households with asset stocks up to A_S, and L_2 for households with assets in excess of A_S. Although each of these livelihood functions exhibits diminishing returns, there are locally increasing

[13] Note that the household restricted to *L1* would choose a lower steady state level because the marginal returns to further accumulation (given by the slope of the production function) do not warrant additional savings. As illustrated in Figure 2, households restricted to either technology accumulate assets only up to the point where marginal returns are equalized.

Figure 2: Asset-Income Relation Under Multiple Livelihoods

returns in the neighborhood of A_S, the threshold at which households optimally switch from L_1 to L_2. Households below the asset poverty line could be following either strategy, but above it they are almost certainly practicing L_2. There are plentiful empirical examples of such patterns, for example, households possessing more assets who adopt higher-return crop varieties or agronomic practices, wealthier households who get skilled salaried employment rather than unskilled casual wage labor, or households who graduate from poultry or small ruminants to indigenous cattle to improved dairy cattle and advanced animal husbandry practices (*e.g.*, artificial insemination, supplemental feeding, etc.) as wealth grows and these methods become affordable.



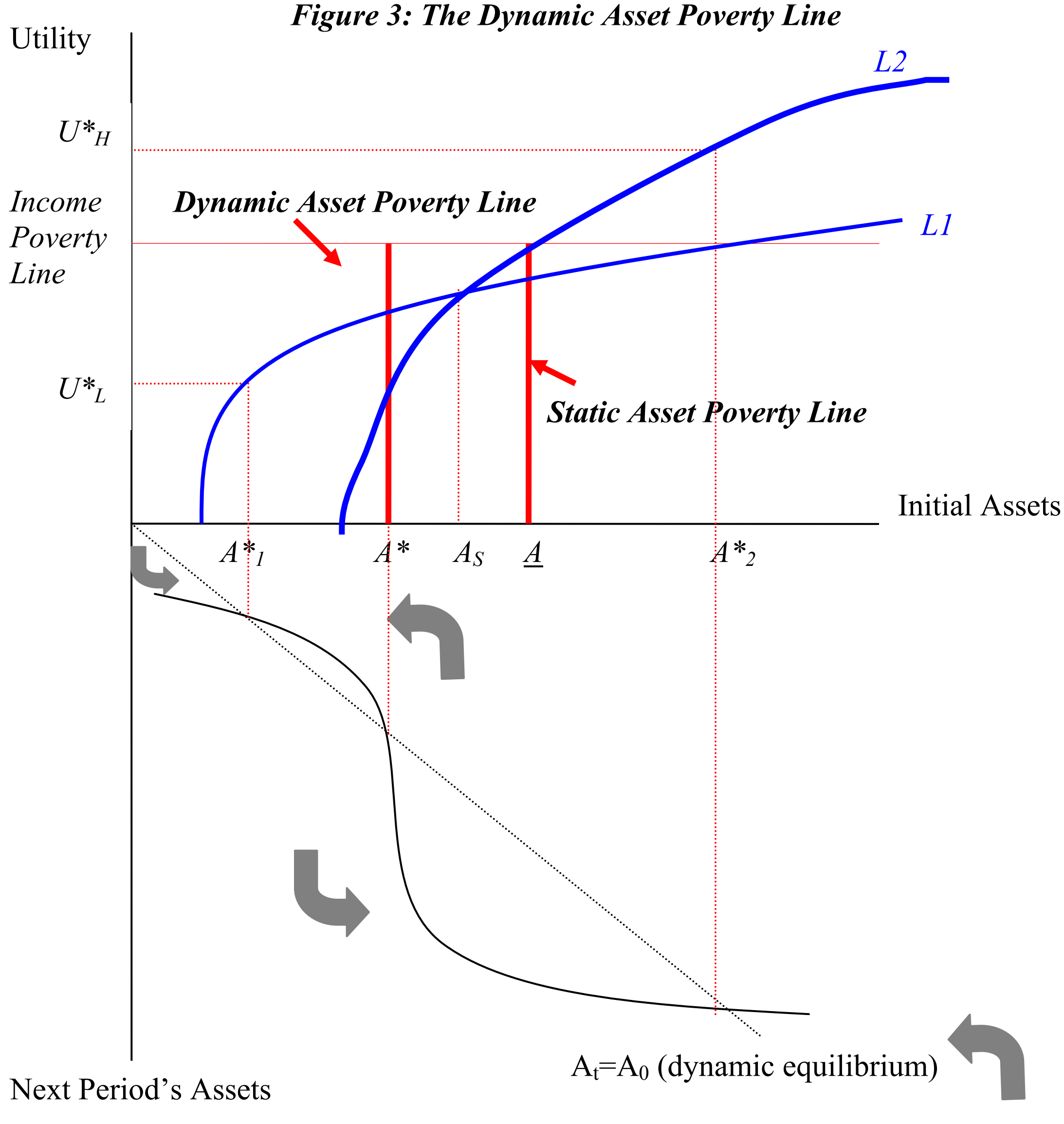
As with technologies that themselves exhibit increasing returns, as discussed in the prior section, the key question is under what circumstances would the existence of this pattern of locally increasing returns created by the union of the two distinct livelihood functions impede the ability of initially low wealth households (those with assets below A_S) to catch up with initially wealthier households. Perhaps the most common reason is unequal access to finance: credit, insurance or savings. If poorer, more liquidity constrained households cannot borrow or save so as to finance the fixed or switching costs associated with higher-return options, or if they cannot get insurance to guard against downside risk, they will commonly follow strategies with lower expected returns than the strategies that are optimal for households with unrestricted access to finance. Social barriers can likewise impede access to more remunerative strategies, as when women or certain racial groups are effectively barred from certain professions or when particular ethnic or religious groups cannot enter the social networks necessary for financial success in particular industries.

While the theoretical literature offers insights as to when such a threshold will occur, we now consider the testable implications of the existence of such a threshold if it does occur. For illustrative purposes, denote $A^* < A_S$ as the critical dynamic asset poverty threshold. As discussed before, households with assets in excess of A^* will choose to save and accumulate (despite low marginal returns to accumulation) until they reach the point A_S where it becomes optimal to switch to livelihood strategy L_2 and to grow to a steady state level of capital, A_2^*. Households below this threshold will by definition not find it optimal to make the sacrifices needed to reach A_S. Absent access to intermediate capital, such households will thus revert to a steady state level of capital, A_1^*.

Figure 3 portrays this scenario and its implication for asset dynamics. The top panel depicts Figure 2's two distinct livelihood strategies, L_1 and L_2. The bottom panel shows the asset dynamics that ultimately drive the system. Now we can better see how the critical threshold for poverty dynamics is neither $\underline{A}$, the static asset poverty line, nor

A_S, the point at which households rationally switch from L_1 to L_2 in the static model, because while adoption of improved livelihood strategies is indisputably important, such choices are also reversible. Rather, the critical threshold is A^*, the unstable dynamic asset equilibrium, the threshold at which accumulation dynamics bifurcate. A household with initial wealth just above A* will naturally accumulate assets, at some point pass A_S and switch from L_1 to L_2, and ultimately settle at

Figure 3: The Dynamic Asset Poverty Line



a long-term equilibrium asset stock of A_2^*, yielding steady state utility U_2^* above the income poverty line. By contrast, a household with initial wealth just below A^* will naturally shed assets down to A_1^*, never switch to the more remunerative livelihood strategy, and settle ultimately at an equilibrium welfare level of U_1^*, well below the income poverty line. This is the way in which the multiple livelihoods often observed in cross-section combine with the bifurcated asset dynamics sometimes observed in time series to generate multiple dynamic equilibrium welfare levels, potentially including poverty traps such as that associated with U_1^* and A_1^*. The key threshold is A^*, the dynamic asset poverty line – the Micawber Threshold – here depicted as lying below the static asset poverty line, although in some contexts that ordering could be reversed, as Adato, Carter and May (this volume) demonstrate in the case of South Africa.

Finally, it is worth remarking that a Micawber threshold can exist even when there are no technical increasing returns to scale (case 1) and no minimum project sizes or investment indivisibilities (case 2), as Zimmerman and Carter (2003) show. However, for present purposes, the key observation is that the existence of dynamic asset poverty thresholds is ultimately an empirical question of fundamental importance to the design of poverty reduction strategies.

IV. EMPIRICAL STRATEGIES TO IDENTIFY POVERTY DYNAMICS AND CRITICAL ASSET THRESHOLDS

A very recent empirical literature has begun to test for the existence of poverty traps.[14] Unfortunately, much of this literature has taken its cue from the macroeconomic growth literature on convergence, and explores the dynamics of household income or expenditure, often using parametric methods that assume globally decreasing returns to scale. However, as the discussion here has made clear, poverty traps are defined by a threshold in <u>*asset*</u> space around which accumulation dynamics bifurcate. A household that suffered a temporary income shock that pushed it below the poverty line, but which did not degrade its asset base, would be expected to recover to its pre-shock level of well-being.[15] That is, in the language of this paper, households that suffer stochastic income poverty transitions should not be expected to fall into poverty traps.

In contrast, a household that suffered a loss of productive assets (e.g., a loss of assets that pushed it below the dynamic asset poverty threshold $A*$ in Figure 3) might indeed fall into a poverty trap. In short, without a firm grounding in an asset-based approach to poverty — which permits us to distinguish the dynamics of households that experience stochastic from structural transitions — we cannot test empirically for the existence of poverty traps.[16]

[14] See for example, Adato, Carter and May (this volume), Barrett et al. (this volume), Dercon (2004), Elbers et al. (2002), Jalan and Ravallion (2002, 2004), Lokshin and Ravallion (2002), Lybbert et al. (2004), Ravallion and Jalan (1996).

[15] The experience of graduate students who leave professional employment to go back to school offers an intuitive example from a very different context. The student's income typically falls sharply, often dropping the student and her family below the income poverty line, but her asset stock is preserved, even built up, enabling predictable, subsequent recovery to a non-poor equilibrium income level.

[16] In principle, the same comment could be made about the macroeconomic literature. Note that growth models are ultimately models of the steady state levels of productive assets (capital), with steady state growth equal to the rate of technological change. However, in the case of nations, national output or income is a fairly stable index of the underlying level of productive assets as national income deviates relatively little from its expected value. At the microeconomic level, household income can depart quite significantly from its expected income and thus offers a far less reliable index of underlying assets.

To date, however, there has been no systematic development of empirical strategies to identify poverty dynamics and critical asset thresholds. This section briefly maps out key elements of the extant tool kit for exploring this exciting topic.

(a) *Flexible Methods for Estimating Dynamic Asset Poverty Thresholds*

Estimation of the sort of asset dynamics displayed in Figure 3 in order to test for the existence of a dynamic asset poverty threshold confronts two basic problems. First, not only is the relationship potentially highly non-linear, but also the dynamic asset poverty threshold is an unstable equilibrium, away from which households move over time. The instability of this equilibrium means that we would expect to observe few households in the neighborhood of the threshold. The second problem is that most households possess a portfolio comprised of multiple assets. Estimation of asset dynamics must somehow deal with this dimensionality problem.

Lybbert et al. (2004) examine a pastoral population whose major productive asset is livestock. This feature of the economy they study makes the second basic issue, asset aggregation, relatively easy to solve.[17] To solve the first problem, Lybbert et al. estimate livestock dynamics using a non-parametric kernel estimator. This estimator is sufficiently flexible to capture high-order non-linearities. In addition, because it is non-parametric, local curvature is estimated using nearby points, meaning that a local twist in the asset dynamics relationship is not overwhelmed by the weight of distant points, as might happen using parametric regression methods. Lybbert et al. find strong evidence of a dynamic asset poverty threshold as well as evidence that, as predicted, recovery from

[17] Following common practice in the study of livestock, Lybbert et al. (2004) aggregate heterogeneous livestock into "tropical livestock units" using a generally accepted weighting system that permits sheep and goats to be aggregated with larger animals such as cattle and camels.

shocks depends fundamentally on whether or not the shock casts the household below that threshold. These results corroborate qualitative ethnographic research among pastoralists in the same region (Barrett et al. this volume).

The asset aggregation issue is less easily solved in the case of more complex economies. Barrett *et al.* (this volume) and Adato, Carter and May (this volume) flexibly estimate asset aggregation weights using factor analysis or by regressing expenditure or other well-being measures on households' productive assets. As detailed in those papers, these approaches permit the creation of asset indices in which the weights can both vary over time and depend themselves on the presence or absence of complementary assets in the household's wealth portfolio. While the properties of these asset indices have yet to be fully worked out, they permit the authors to test for the presence of dynamic asset poverty thresholds in more complex economies, again using relatively simple non-parametric kernel or nearest neighbor estimators.[18] Both papers find evidence of such thresholds.

(b) Directions for Future Analysis of Asset Dynamics

The bivariate non-parametric methods employed by Lybbert et al., Barrett et al. and Adato, Carter and May all presume that households in the same structural position all lie within the same accumulation regime. However, as the theory of poverty traps makes clear, households facing otherwise identical initial conditions may follow different accumulation trajectories if one enjoys better capital or insurance access than the other. And households with equal access to finance may face quite different accumulation

[18] Barrett et al. (this volume) also use parametric methods that yield qualitatively identical estimates of the critical asset threshold, but which fit the data far less well in the tails of the wealth distribution.

trajectories when they have different livelihood functions due to spatio-temporal variation in agro-ecological or policy conditions. The challenge is to find ways of separating households into distinct capital access and accumulation regimes conditional on underlying livelihood mappings, either via ex ante measurement or through the development of sufficiently flexible econometric methods. In addition, a secondary problem is to control for other factors may influence accumulation (*e.g.*, life cycle household savings patterns) that could be spuriously correlated with initial asset holdings.

The study of poverty dynamics and the identification of critical asset thresholds are among the tasks best suited to mixing qualitative and quantitative methods (Hulme and Shepherd 2003). Panel data can be used to stratify households for qualitative study via oral histories (e.g., Barrett et al. this volume, Adato, Carter and May, this volume), participatory methods can be used to define poverty transitions then studied quantitatively using survey methods (Krishna 2003, Krishna et al. 2004, Kristjanson et al. 2004), or other means of sequential or simultaneous mixing of qualitative and quantitative methods can be effectively employed. Qualitative analysis can be especially valuable in identifying historical causes of structural transitions that predate initial surveys.

(c) Directions for Poverty Measurement

Identification of prevailing asset dynamics and a dynamic asset poverty threshold also enables a fruitful link back to familiar, first generation Foster, Greer and Thorbecke (FGT) class of P_α poverty measures. Recall that the FGT class of decomposable, single-period poverty measures are simply

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{N} I_i \left(\frac{z-u_i}{z}\right)^\alpha$$

where N is the sample size, z is the scalar-valued poverty line, u is the flow-based measure of welfare (income or expenditures), I is an indicator variable taking value one if $u_i<z$ and zero otherwise, and α is a parameter reflecting the weight placed on the severity of poverty. P_0 (i.e., $\alpha=0$) yields the headcount poverty ratio – the share of a population falling below the poverty line – while P_1 and P_2 yield the poverty gap – the money metric measure of the average financial transfer needed to bring all poor households up to the poverty line – and the squared poverty gap, a more distributionally-sensitive indicator of severe poverty.

We now briefly outline two extensions of the FGT class of poverty measures which naturally emerge to account for the expected dynamics of household welfare. The first retains the focus on flow-based welfare measures such as expenditures or income that prevails within contemporary poverty analysis, but exploits the structural relation between asset stocks and resulting welfare flows as well as the inherent dynamics of asset stocks. The second, more in keeping with the spirit of our advocacy for an asset-based approach, recasts the FGT measure in asset space.

The first option integrates the familiar FGT formula with the dynamic framework reflected in Figure 3 to measure the discounted stream of expected welfare levels relative to the poverty line using the structural poverty mapping from assets to income or expenditures, $u_t(A_t)$, and the expected asset dynamics, $A_{t+s}(A_{t+s-1},\ldots,A_t)$. We can thereby generate a dynamic generalization of the FGT class of poverty measures, P_α^D, as follows:

$$P_\alpha^D = \frac{1}{N}\sum_{i=1}^{N}\ \sum_{s=0}^{\infty}\beta^s I_{it+s}\left(\frac{z-u_{it+s}(A_{it+s}(A_{it+s-1},\ldots,A_{it}))}{z}\right)^\alpha$$

where $\beta \in [0,1]$ represents a discount factor and the other variables are natural extensions in the time domain of the static FGT formula. This dynamic version of the FGT measure would rely on familiar flow-based welfare measures such as income or expenditures, but would exploit the structural mapping between assets and flow welfare measures and underlying asset dynamics within the local economy to distinguish effectively between those who are poor but predictably improving and those who are poor and stuck indefinitely in a low level equilibrium trap.[19]

The second alternative poverty measure focuses on the gap between households' current asset holdings and those necessary to move them currently and permanently above the asset poverty line. The class of decomposable asset-based poverty measures, P_α^A, can be described by the following formula:

$$P_\alpha^A = \frac{1}{N}\sum_{i=1}^{N}\left[I_i^{\underline{A}}\left(\frac{\underline{A}-A_i}{\underline{A}}\right)^\alpha + \beta I_i^{A*}\left(\frac{A*-\underline{A}}{A*}\right)^\alpha \right]$$

The P_α^A measures employ two terms and associated indicator variables to capture each household's distance from the static and dynamic asset poverty lines, respectively. The first indicator variable, $I_i^{\underline{A}} = 1$ if $A_i < \underline{A}$ and zero otherwise, reflects whether the household's ex ante asset stock falls below the static asset poverty line. This captures the asset transfers necessary to make a structurally poor household structurally non-poor in the current period. The second indicator variable, $I_i^{A*} = 1$ if $\underline{A} < A*$ and zero otherwise,

[19] For the present period, *s=0*, one could use either realized expenditures or income, u_{it}, or predicted structural expenditures or income, $u(A_{it})$, depending on whether or not one believes the true stochastic portion of current income dominates measurement error.

reflects the possibility that the transfer necessary to make a household structurally non-poor today might not prove sustainable if the prevailing asset dynamics are such that an asset stock of $\underline{A}$ naturally degrades over time, so that the household would predictably be poor again in short order even after augmentation of its initial endowments to $\underline{A}$. In this case, the household's future asset poverty is reflected by the discounted distance between $\underline{A}$ and A^*. This class of dynamic asset poverty measures will count as asset poor those who are presently structurally poor as well as those who are presently structurally non-poor but who one would expect to become structurally poor in time. In this sense, it more accurately reflects the strategic policy questions towards which the Washington Consensus was originally oriented: what asset accumulation is necessary to lift people out of poverty (i.e., what is $\underline{A}$-A_i) and what change in returns on assets is necessary to stimulate endogenous accumulation (i.e., where is A^* and how can we reduce it)?

In offering this brief illustration as to how the emerging insights of fourth generation poverty analysis might usefully integrate the familiar tools of first generation methods, we have maintained the strong assumption that the full range of productive assets under a household's control can be meaningfully reduced to a scalar-valued number. We leave the generalization to multi-dimensional asset space to future work. We likewise leave implementation of these measures, and their extension to polarization measures based on Esteban and Ray (1994) and Ray, Duclos and Esteban (2004), to future research. Our point in this brief section is simply to illustrate that taking advantage of emerging capabilities to study poverty dynamics structurally does not imply a need to jettison familiar, useful poverty measures. Rather, we can adapt them easily.

V. PERSISTENT POVERTY REDUCTION STRATEGIES

This paper has argued that reformulating poverty analysis explicitly on an asset basis offers important advantages. Identification of the asset poverty line makes it possible to distinguish structural from stochastic poverty transitions. Identification of the dynamic asset poverty threshold permits a further refinement of poverty measurement, making it possible to distinguish households likely to escape poverty over the longer term from those apparently mired in a poverty trap. Application of these structural or asset-based approaches to poverty should ultimately underwrite a more satisfying analysis of the contentious question of the impact of market-oriented liberalization policies on long term poverty dynamics.

While these measurement issues are important, the deeper value of an asset-based approach emanates from its policy implications. First, this approach permits us to determine whether there exists a minimum configuration of assets or economic conditions required for households to engineer their own escape from poverty. From this perspective, the asset-based approach we advance adds specificity to John Williamson's (2003) call for a minimum asset bundle.

In addition, the asset-based approach has important implications for the design of safety net and relief programs. A natural disaster or other economic shock that destroys assets and thereby knocks a household below the dynamic asset poverty threshold could have permanent effects. Absent relief or other intervention, a household in this situation would be expected to face further post-shock deterioration in their position as they fall back to a low-level, poverty trap equilibrium. The implications for the timing, targeting and duration of relief assistance — determining where safety nets are positioned and how they are operationalized — are potentially large. Third and finally, the asset-based approach gives firm priority to efforts to rectify the mechanisms of financial exclusion that underlie poverty traps. In summary, a theoretically informed asset-based approach to poverty should not only help analysts determine for whom the economy is working, but also assist in the identification of the conditions and policies needed to assure that time works for all as an ally in the alleviation of poverty.

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